Submission in Response to the "Future Use of Unassigned Television Channels" Discussion Paper of the Australian Communications and Media Authority

Submitted by

The Interactive Television Research Institute
Murdoch University – Western Australia
April 24, 2006

Prepared by
Professor Duane Varan

1. Background

The Interactive Television Research Institute is an independent non-profit interdisciplinary research centre based at Murdoch University in Perth, Western Australia. Our clients and research partners are global in character and include many of the world's leading advertising brands and media platforms. Such clients include British Sky Broadcasting (BSkyB), the BBC, DirecTV, Turner Broadcasting, ESPN and the American Broadcasting Company. Collectively, our advertising clients account for approximately a third of the US television ad spend. Many now view the Institute as providing one of the world's leading research centre's in study of consumer behaviour associated with the evolving digital television industry.

Despite our global focus, we have maintained an active research agenda on issues specific to the Australian market. Recently, for example, we completed a three year study exploring how pre-school aged children respond to interactive television applications. This ARC funded project (in collaboration with the WA Department of Education, the Australian Broadcasting Corporation, Nickelodeon and the Nine Network) has seen over 500 children participate in research conducted in our Portable Audience Research Centre (PARC) – a portable lab housed in a caravan which visited 21 schools. We have also engaged in a number of studies exploring consumer responses to a wide range of digital TV applications. In terms of issues associated with Australia's digital policy, we remain active participants and have engaged in a number of policy studies – indeed, the 'beauty pageant' datacasting option put forth by the Australian Democrats was based, in part, on our submission to the Datacasting Review in advance of the 2000 legislation. In 2002 we also conducted a survey of the digital TV industry for the then Australian Broadcasting Authority. Currently, we maintain a panel of 3000 viewers who participate in our various studies on a regular basis.

The Institute collaborates with researchers throughout Australia and the world attracting significant funding from its industry partners as well as from the Australasian Cooperative Research Centre for Interaction Design (ACID) and from ARC grants. To date the Institute has attracted over $5 million towards such research. ITRI researchers also present research findings at major industry conferences throughout the United States, Europe, Africa and Australasia.

The Institute's research facilities provide dedicated infrastructure for the study of interactive television viewing. Our labs on the Murdoch campus provides mock living rooms simulating the in-home experience of viewers. In this environment we test digital TV content – usually using research methods reflecting experimental design so as to compare linear and interactive approaches in a controlled environment where variables can be properly isolated. The lab's infrastructure includes a reference digital head end designed to modulate across satellite, cable and terrestrial platforms; advanced audience measurement tools including eye gaze monitoring (mapping viewer eye movement over the TV screen); biometric measurement tools (including galvanic skin response) and perception analysers to map viewer's moment-by-moment reaction to content.

ITRI has extensive experience associated with a range of questions raised throughout the discussion paper. The Institute's Director, Professor Duane Varan, was the

principle consultant driving the Australian Datacasting Corporation's (ADC) bid for spectrum in the failed 2001 datacasting auction. In that capacity, he formulated their business case and strategy. In 2003 the Institute also applied for significant funding in the Australia Research Council's Linkage Infrastructure Equipment and Facilities (LIEF) grant scheme. Although this application was ultimately unsuccessful, significant work went into preparing the application including technical planning, community consultation, business planning, consumer research and content acquisition. We have also collaborated with researchers at the University of Wollongong and the CRC Desert Knowledge to design a datacasting solution appropriate to the needs of indigenous communities throughout the Australian outback. Such experiences help highlight the degree to which the Institute has taken an applied interest in potential applications for datacasting spectrum.

2. The Primary Objective

Before addressing the specific items raised for discussion, we wish to make some general comments on the wider task of identifying the best potential use for future use of the current unassigned channels.

Australia's digital TV legislation crafted 'datacasting' channels with very specific objectives. Then Minister Alston summarised this well when he identified three keys pillars to the digital equation: "The Government's objective is to ensure that the transition to digital TV is as smooth as possible for consumers and, at the same time, provides the right balance between new and existing players."[1]

The strong and active presence of such new players was a key dimension to Australia's digital conversion strategy, acting as a catalyst providing competitive tension for existing broadcasters, thereby stimulating consumer adoption. Without such competition there was a risk that existing FTA broadcasters might become complacent and fail to provide bold and innovative content through which to drive digital penetration.

Clearly, however, the Government's datacasting genre restrictions was overly restrictive and chilled market investment as was demonstrated by the failed datacasting auction. Rather than relax its restrictions or explore alternative approaches to datacasting regulation, the Government adopted an approach based on limited trials. This has clearly failed to provide the market with the type of competitive tension originally envisioned by the digital television legislation.

We make these observations because we believe it is important to keep the overall objective of driving digital take up at the forefront of considerations associated with use of the spectrum in question. Monetary returns associated with allocation of the spectrum and alternative use for the spectrum (maximising spectrum efficiency) are secondary to this overarching objective. Accordingly, we believe, proposals to use the spectrum should be evaluated primarily of the basis of their capacity to help stimulate digital conversion. We will refer to this throughout our submission as the ***'primary objective'*** associated with allocation of the spectrum. We believe it is critical throughout the exploration of possible use of the spectrum to keep the primary objective at the forefront of all considerations. The availability of the spectrum must

[1] Remarks by Senator the Hon. Richard Alston, Minister for Communications, IT & the Arts, to the Digital Revolution Conference hosted by Gilbert and Tobin, June 14th 2000.

be situated within a framework that stimulates digital conversion – which, in turn, necessitates that it provide a clear substitute for existing analogue transmission.

3. The ITRI-DCITA Submission

We have also included, as appendix 'A', a copy of the submission we recently made to the Department of Communications, Information Technology and the Arts (DCITA) in response to the discussion paper: "Meeting the Digital Challenge". Figure (1) reproduces our Bass model of diffusion based on the current reported distribution of digital receivers in the Australian market.

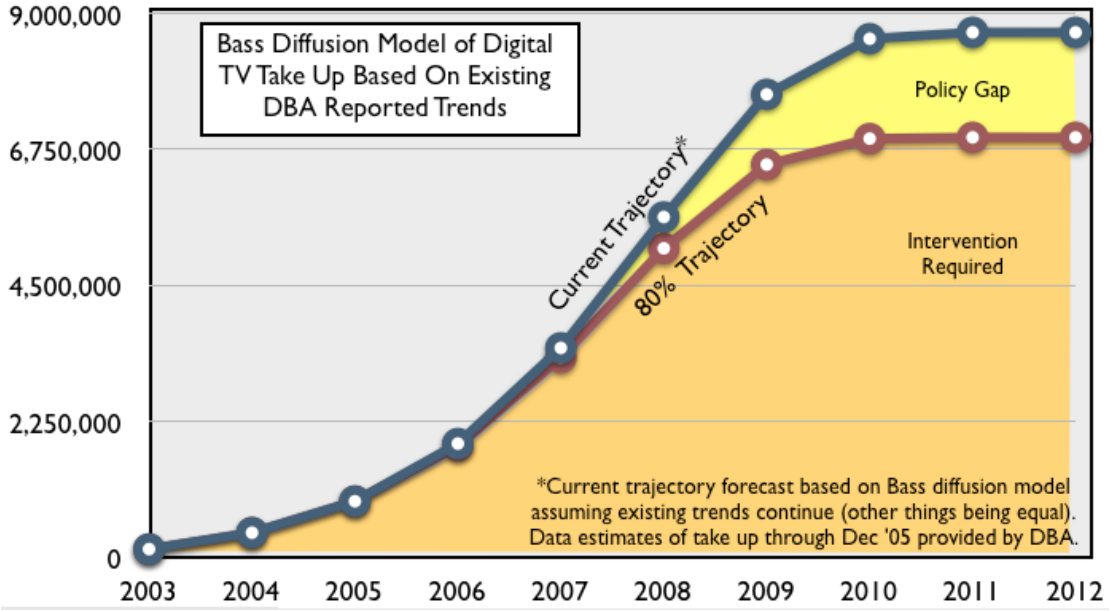

Figure (1): Bass Diffusion Model illustrating current trajectory of digital take up as well as alternative model assuming 80% take up in 2012.

In our submission we note that the recent acceleration in uptake (which may have resulted from a significant drop in the price of receivers) has resulted in a trajectory which suggests that an analogue shut-down in 2012 may be feasible, other things being equal. However, we also note that the current uptake may reflect particular anomalies such as saturated take-up among households with poor analogue reception which may slow in the immediate years ahead. For this reason, we have advocated a major review in 2008 to test whether digital adoption remains on target for a 2012 conversion (this would require a 65% penetration by June, 2008). Our submission recommends intervention in the event that this milestone is not met. If this target is not met, there is a high likelihood that analogue switch-off in 2012 will not be feasible.

Accordingly, we have also recommended that the degree of intervention depend on the amount of the potential shortfall. Under our moderate intervention plan (with penetration above 55%) this might include, for example, easing of multichannelling restrictions. Where more aggressive intervention is required to stimulate the market, more drastic measures might be considered including, for example, the allocation of spectrum for a 4th commercial FTA commercial network (digital only).

In this way, we believe that a two step approach to the allocation of the unused spectrum maximising flexibility associated with possible use of the spectrum as it relates to the primary objective of stimulating digital conversion. This would see allocation of the first lot of channels in 2007 and a subsequent allocation in 2009 (following review in 2008). We will refer to these as the '2007 allocation' and the '2009 allocation' throughout this submission. Such an approach not only optimises the capacity to stimulate digital take up, but it also provides opportunity to again evaluate industry developments so as to identify the approach best suited to the Australian market.

The adoption of such a phased approach to policy, based on the degree to which key milestone adoption targets are met, inherently necessitates a staged approach to the allocation of spectrum. This would require partial allocation of spectrum as soon as practical with a second wave of spectrum held in reserve for allocation following the 2008 review at which time the specific category of service associated with the new spectrum can be determined based on the degree of intervention required.

We believe this approach will best meet the strategic interests associated with Australia's digital conversion challenge.

We will now comment on the specific issues raised in the discussion paper.

4. Category of Service

The discussion paper seeks comment on whether the spectrum should be used for datacasting, open narrowcasting and/or subscription services.

It is difficult to assess the viability of use of the spectrum for datacasting services as it is not clear what restrictions will be imposed on the service. We note that there are clear business models associated with such services even within the Australian constraints, as was apparent in ADC's business model (which, unfortunately, remains confidential). ITRI's proposed Peel datacasting service also found a way of developing a service that complied within these restrictions. However, the collapse of the datacasting auction highlights the extent to which the market has clearly rejected the current genre-based restrictions model.

Consequently, Minister Coonan's comments indicating that a new datacasting regime would accompany media reform is reassuring. However, the lack of detail associated with such datacasting reform is disappointing because it is almost impossible to explore possible interest without more clearly defining exactly what the new datacasting regime would be. Certainly, one can envision 'high interest' for the spectrum where such restrictions are minimal and 'low interest' where it continues to be restrictive. To maximise market interest, we recommend minimal restriction in this regard.

As we have argued in the past, because it is difficult to define datacasting, a better approach might be to allow the market to define it in advance of the allocation of the spectrum itself (as part of the allocation process). We will discuss the merits of such a 'beauty pageant' later in our submission. We do believe, however, that the current approach of soliciting such models through submissions in a discussion paper are unlikely to disclose the parameters associated with potential datacasting business

models. Although this discussion paper has solicited views on how people might use the spectrum, it is highly unlikely that anyone with a good model would disclose that unless it was part of the actual bidding process itself.

With regards to narrowcasting services, it is entirely possible that a range of possible services targeting special interests groups (such as foreign language services) might provide some stimulation in digital uptake. We would maintain, however, that such systems should be required to integrate existing FTA channels on their platform (DVB-T), otherwise they will not promote the wider objectives associated with digital conversion. Accordingly, we maintain that this would also provide a viable use for the available spectrum provided it adopted standards accommodating FTA channels.

Likewise we believe that a subscription service could also stimulate digital take up provided that FTA channels were also available (free of cost) on subscriber's receivers. This particular use, however, has to be weighed against other policy decisions of the Government associated with the balance it seeks between its anti-siphoning regime and pay TV policies.

In sum, we have no objections to any of the category of services under consideration, though we appreciate that in considering subscription services the Government will have to weigh this option against those associated with its overall subscription television and anti-siphoning policies. Our primary concern is that whatever category of service is adopted require that the service integrate access to FTA channels, otherwise analogue substitution is not achieved.

5. Mode of Delivery

The potential use of digital TV signals for mobile services provides an interesting potential application for use of the spectrum. Provision for such use of the spectrum would probably maximise the potential financial returns to the Commonwealth through an auction allocation. It could also provide the market with a wide range of new innovative content formats. This, in turn, could help stimulate content producers in a manner which could help improve their capacity to export such content.

In exploring such opportunities, however, we believe it is also important to ensure such services remain consistent with the original objectives associated with the digital legislation. If the primary objective is to stimulate digital conversion, then the approach to allocation of this particular spectrum for mobile purposes should be done in a manner which promotes analogue substitution. This implies, for example, that spectrum could be available for dual use (e.g. with part of the spectrum used for fixed or datacasting channels and part for mobile). Alternatively, an approach which ensured the allocation of both datacasting AND mobile services (two channels) might be considered. But we maintain that allocation of spectrum for mobile television services alone will not promote digital conversion's primary objective as it will not provide inherent substitution of analogue transmission.

Consistent with our staged approach to spectrum allocation, this would imply that allocation of a full channel for dedicated mobile services alone should be held in reserve for our proposed 2009 allocation. We have no objections, however, to partial use of available channels for such mobile services in a 2007 allocation.

6. Other possible uses – Interactive Television

We believe that there would be strong demand for use of the spectrum for interactive digital television content and applications provided excessive restrictions were not imposed on such services. Television advertisers are gradually shifting from marketing objectives centred on 'exposure' to those centred on 'engagement'. The provision of interactive services helps provide such advertisers with exciting new opportunities to refine television advertising models so as to better capitalise on consumer engagement. Clearly, the UK experience to date has demonstrated a strong latent demand among advertisers for such services. Our own research has consistently demonstrated the superiority of these new interactive advertising models.

We believe that significant change in audience measurement will take place over the course of the next 5 to 10 years which will demand metrics beyond those currently provided through sample-based ratings. This will, almost certainly, require methods of retrieving data back from actual audiences, necessitating a back-channel. The deployment of interactive services helps provide critical infrastructure which, we maintain, will be critical to terrestrial television's future business models. This will be all the more important as pay TV penetration grows in Australia and FTA channels find themselves more aggressively competing with the pay TV sector for advertising dollars. In this environment, FTA broadcasters unable to provide interactive services will be at significant disadvantage.

Our Peel Datacasting proposal included the use of RCT technology. Our attraction with the return system was primarily based on its potential to access such data retrieval metrics for our audience measurement systems. Given the relatively low datarate associated with such information flow, the RCT system was perfectly suited to our needs. A key barrier, of course, is the relative cost associated with potential deployment in receivers, primarily a function of the limited scale of manufacturing associated with the technology at the current time. For the purposes of audience measurement, however, we believe this cost would be subsidised by those seeking access to its data. We believe that the audience measurement task provides a potential anchor for the deployment of RCT, which then enables a limited range of other potential two-way interactive services.

Our submissions to both DCITA (appendix 'A') and to the Standing Committee on Communication, Information Technology and the Arts Digital Television Inquiry (appendix 'B') recommends that allocation of one of the two channels available in most markets be done in a manner which awards this provider a 'platform integration' role. Currently, Australia lacks such platform integration. In effect, there are currently five to six different platforms as each broadcaster maintains control over their own spectrum. If the 2007 channel recipient was committed to deploying interactive services (a commitment currently lacking among existing FTA channels), they could provide access to their backchannel to all FTA broadcasters in a manner which could stimulate further innovation in the market. Clearly, under such an approach, competition regulation would need to be imposed to guarantee appropriate terms of access to the platform by existing FTA digital broadcasters.

7. Use of spectrum for other purposes

We appreciate that the unused spectrum could be used for applications unrelated to television. We caution against such allocation. Analogue shutdown will make

available spectrum (the digital dividend) which is many folds larger than any spectrum currently available. We believe it is important to remain focused on the overall objectives associated with digital conversion – so that a much larger pool of spectrum can be released to the market in future years. Allocating spectrum for other purposes now may jeopardise significantly larger returns associated with the digital dividend in 2012.

8. Demand for channel

As noted earlier (see item 4), while we appreciate ACMA's intent in soliciting views on how potential spectrum will be used, we maintain that it is highly unlikely that compelling application for the spectrum will be 'floated' in submissions to a discussion paper – particularly where the primary approach to allocation under consideration is auction-based (which could have the effect of driving potential bidding prices upward).

Certainly we have previously expressed our desire to deploy a datacasting channel, primarily for research purposes, in a single test market. We note, for example, that the 2001 datacasting auction made available three channels for the Perth market even though only two were made available for the rest of the country. Our interest would primarily be in acquiring such 'third channel' spectrum if it were available in the market. However, we caution that despite our interest, we would be unable to afford to 'buy' such spectrum outright. Our funding would need to focus on transmission infrastructure and, most important, research infrastructure (including an active backchannel) through which to analyse viewer behaviour.

9. Coverage Area

Consistent with our recommendation for a pageant-based method of allocation, we believe that the question of national vs. local lot allocation should be resolved through pageant bids rather than upfront. Clearly there are a wide range of community considerations, including the availability of local content, that might be considered when allocating channels. It is impossible to determine which approach to coverage will inherently best meet such interests without seeing the specifics associated with any particular channel. It could be, for example, that a provider could supply a national network with a high degree of local content. By way of contrast, it is entirely possible that a local provider might supply a channel with almost no local content.

Accordingly, we recommend that the question of coverage area be a key criteria to be addressed by bidders in a pageant-based allocation process.

10. Channel Allocation

As noted above (in item 9), we believe that questions associated with whether channels should be allocated individually or as a package are best addressed in pageant-based bids. The same applies to questions associated with the amount of spectrum required. It is possible, for example, that based on bids received, allocation of channels with less than 7 MhZ are considered – but this can only be determined once the parameters of the proposed services are identified.

We would argue against both channels being linked to a single operator due to both the competition implications (such an approach lacks competitive tension which does not serve the best interests of stimulating consumer adoption) and the two-staged

approach we have recommended earlier. However, we have no objections to 2007 channel recipients making a case for additional spectrum in our proposed 2009 allocation round. Naturally, competition issues might form a part of the criteria under which such second round applications are evaluated.

11. What Should Be Allocated

We believe that a pageant-based approach maximises the opportunity to best determine the technical configuration associated any specific allocation. Through such a process, the need for repeater channels or potentially new transmitter sites can best be considered. Likewise, questions associated with potential accommodation for both mobile and fixed (if required) can best be resolved.

12. Competition Issues

Consistent with our two staged approach to allocation, we believe that a single operator should be prevented from bidding for more than one channel in the 2007 allocation round. We would maintain that such operators may be allowed to make a case for competing for additional spectrum in a 2009 round, however this will have to be evaluated against other bids and with regard to potential competition constraints.

We maintain that while it is critical to continue imposing the prohibition on FTA broadcasters controlling the new spectrum (so as to introduce new drivers in digital take up), there is no need to inherently deny access to any other potential operator. In the case of Telstra, we believe that their market dominance should constitute a factor that is taken into consideration in our proposed pageant-based allocation process – but this must be weighed against other considerations.

We see no reason to impose inherent national coverage limits. The current limited take-up of digital imposes no immediate case for limiting such coverage, and by the time the take-up is large enough to pose such risk, there is likely to be available a wide range of other technologies (including IPTV services) mitigating such risk.

With regards to city vs. regional restrictions, we believe this question is best addressed by evaluation of pageant bids.

13. Use it or Lose It License Conditions

Given our two staged approach to allocation, we believe it is critical to impose 'use it or lose it' obligations on channel recipients that require full-scale deployment of the proposed service by January 1st, 2008 at the latest (but as soon as possible following allocation of the spectrum) so that the channel's experience can be assessed in determining the nature of the 2009 allocation. The specific parameters of the conditions associated with the channel (including whether the channel will be in continuous use and its minimum coverage area) should form part of the pageant bid such that it formulates a charter against which the 'use it or lose it' license conditions are determined (promise vs. performance).

Where an operator fails to appropriately deploy their service, consistent with their original bid, the spectrum should be re-allocated as part of the 2009 allocation round.

14. Digital Dividend

We appreciate ACMA's concerns associated with potential issues associated with spectrum shifting of channels at a later date. We believe this further highlights the need to use the current allocation process to help stimulate platform integration which will better enable channel navigation in a manner which breaks dependency on channel numbers for marketing purposes. Without such integration, there are significant losses associated with the shift in channel as marketing of the new channels would almost certainly be built on channel numbers. With integration, however, it becomes easier to market identity around a brand visible through the interactive navigation path (on an interactive EPG, for example).

15. Method of Allocation

As we have argued previously, an auction-based approach to allocation of the spectrum will not best meet the overall objectives associated with digital conversion.

The Radiocommunications Act of 1992 stipulates that spectrum should be managed so as to "maximise, by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using the radiofrequency spectrum."[2] Two arguments which are usually made in support of an auction-based approach:

a) That an auction delivers the most efficient manner of allocating spectrum
b) That an auction maximises public benefit by delivering strong financial returns

With regards to former, there is no question that an auction is the most convenient method of allocating such spectrum as the government is then not tied up is having to make a selection and defend that decision among challengers. If, however, the merits of the auction centre on such capacity to 'naturally' identify winners, then the 2001 auction should not have been cancelled as it had 'naturally' identified the three operators prepared to provide datacasting services to the market.

Such efficiency in allocation not only applies to the initial allocation, however, but also to the likelihood that the spectrum will be put to good use (the process is not efficient if the 'winner' fails to get traction with their service). There have been numerous cases of late where this process has either produced the wrong operator (cash alone does not inherently result in the best providers accessing the channels)[3] or where the money invested in acquiring the spectrum compromised the capacity to then put it to good use.

In terms of maximising public benefit, first and foremost, it is not clear that an auction is the best path, in this case to delivering such returns. The biggest problem associated with datacasting is the lack of certainty it provides due to the restrictions which are imposed on the service. Even new restrictions will probably have this effect because they have to be cast wide so as to allow for a very broad range of possible contingencies. By way of contrast, however, a pageant provides potential operators with the certainty they need to deploy their own business plans. Such an approach maximises the potential latitude of business cases which might be considered, which in turn provides maximum value for the spectrum. We would

[2] Section 3, part 1.2, paragraph 3(a) of the Radiocommunications Act of 1992

[3] One can imagine, for example, a provider with significant cash winning spectrum but lacking the 'know how' or access to compelling content to then be able to put such spectrum to good use. The content side of the equation, in particular, makes television very different from telecom services.

maintain that such an approach will deliver greater financial returns to the government than an auction.

The capacity of a pageant to better identify operators best positioned to advance digital conversion also significantly improves the chances associated with a digital dividend in 2012, thereby maximising potential financial returns in the long run.

Also, we caution against reduction of 'public benefit' to financial returns to the government alone. As we have demonstrated in our research to date, there are a number of significant benefits to the community associated with new digital services. We have demonstrated, for example, that interactivity can significantly enhance the educational impact associated with children's television programming. Likewise, there have been a number of pilot projects in the UK which have demonstrated strong capacity to use digital channels for government services (particularly health). There are also strong benefits to the community associated with the availability of local content, and further benefits associated with local access to such spectrum. An auction simply cannot guarantee that such benefits materialise.

As we have noted throughout this submission, the primary use envisioned for allocation of the spectrum to begin with was digital conversion (which then results in significantly more spectrum becoming available). An auction-based approach provides little reassurance that the spectrum will be put to good use in stimulating digital take-up. In this way the auction of television spectrum differs from that of telecom services because successful TV models depend heavily upon content and on demonstrated capacity to put that content to good use. We maintain that an auction provides a risky path which may not ensure that Australia gets its best chance in stimulating digital take-up.

In our submission to DCITA's 2001 Digital Services Review (appendix 'C'), we argued that a wide range of considerations (and not money alone) should be taken into account when awarding the datacasting spectrum. We compared a range of approaches, then being considered, against key evaluation criteria (which included financial returns to the government through the allocation of the spectrum). Figure (2) provides a reproduction of the evaluation matrix we produced comparing different approachs to datacasting regulation. A pageant approach was best suited to addressing the evaluation criteria.

	Genre Rules	ABA Reg.	Subscription	Interactive	Beauty Contest
Different to Television	1	3	4	5	2
Audience Share	1	4	2	5	3
Program Rights	1	3	5	4	2
Advertising Revenue	1	4	2	5	3
Serve Community Interest	2	3	5	4	1
Government services	2	3	5	2	1
Local content	1	4	5	4	2
Community Television	2	3	5	4	1
Broad Coverage	4	3	5	2	1

Financial Returns	5	4	2	1	3
Stimulate Digital Conversion	5	4	1	3	2
Compelling Content	5	4	1	3	2
Deliver Credible Player	5	4	2	3	1
Business Certainty	5	4	2	3	1
Different to Subscription TV	1	3	5	4	2
Complexity of Admin. Scheme	4	5	1	2	3
Total (less is best)	45	58	52	54	30
Overall Ranking	2	5	3	4	1

Figure (2): Datacasting Policy Framework matrix (lower scores are better)

We would recommend that in considering how the existing lot of unused channels be allocated, a similar decision matrix be developed for ACMA which responds to its specific criteria. We believe that such a process will demonstrate the inherent superiority of a pageant-based approach.

16. Compression Standards

Consistent with the views we have expressed earlier, we maintain that analogue substitution must be a clear priority associated with use of the new channels. While we appreciate the benefits associated with MPEG-4, particularly in significantly increasing the number available channels, we believe that stimulating digital take-up inherently demands that viewers be able to access FTA digital channels.

We have no objections to approaches which will result in receivers capable of receiving *both* MPEG-4 and MPEG-2. However, given the absence of mandatory standards in Australia, we are not sure how quality control over such receivers could be enforced to ensure that they were providing both compression systems. We do not believe it is in the best interests of the digital conversion strategy to see 'MPEG-4 only' set top boxes in the marketplace as this will not facilitate analogue shut-down.

In light of the limited capacity to enforce dual use (MPEG-4 and MPEG-2) receivers in the market, we maintain that channels should be required to use at least part of their spectrum for MPEG-2 streams.

17. Conclusion

Throughout this submission, we have shared our views across a wide range of issues. However, we believe that the crux of our submission boils down to three key principles:

a) The new channels should be put to use in the interest of stimulating digital take-up in a manner which accelerates analogue shut-down.
b) This is best facilitated in a two staged approach which has spectrum allocated in 2007 and 2009 rounds. This maximises the capacity to determine the degree of intervention required to further stimulate digital conversion should it appear unlikely that a 2012 analogue shut-down seems viable.

c) A beauty pageant provides the best method of allocation of this spectrum. Consistent with this approach, key technical considerations including coverage area, transmission repeaters, channel size, and the like can best be resolved.

Please feel free to contact us if you require any additional comments or if we can be of any further service.

Appendix A

Submission in Response to the
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Prepared by
Professor Duane Varan, Associate Professor Steve Bellman, Mrs. Anna Hynd

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2. Submission to the House Committee Inquiry

In May, 2005, the Institute made a submission to the House of Representative's Standing Committee on Communications, Information Technology and the Arts Inquiry into the Uptake of Digital Television in Australia ("Digital Television - Who's Buying It?"). In that submission, we argued that Australia's digital conversion policy to date has failed to deliver on its original objectives and that it has largely defaulted into a policy protecting the status quo. The approach has reflected a series of concessions designed to appease particular segments of the industry – resulting in the cobbling together of a 'lose-lose' montage – penalising one market actor to compensate for the fact that another has been disadvantaged in some way. Such an approach, based on assuring mutual disadvantage, clearly fails to respond to consumer demand, inhibiting innovation and chilling market investment.

The submission highlights key failures of the policy to date including an unwillingness to correct the overly restrictive datacasting genre regime following clear market failure in the wake of the collapse of the datacasting auction; the lack of competitive tension (the policy envisioned significant competition between established and new broadcasters which never materialised due to the overly restrictive datacasting restrictions); the absence of any meaningful interactive services; the lack of a backchannel and integrated platform; the absence of mandatory standards across a wide range of issues including receiver standards; constraints which have limited the capacity of national broadcasters to provide the market with innovative services; and the lack of clear consumer incentives and drivers to stimulate digital take up.

The submission concluded with a series of recommendations including the adoption of mandatory standards, the articulation of a digital TV action plan, the release of spectrum for two new digital channels in each market, one of which would play the role of platform integrator/datacaster and the other of which would constitute a digital only 4th network, and to maximise flexibility for spectrum use (including allowance for multichanneling).

The focus of the submission was primarily to voice our concern that the existing policy would fail to meet its objectives by the 2008 target date. Rather than reiterate these again, we have included a copy of our submission as Appendix 'A'. A copy of

the testimony of ITRI's Director, Professor Duane Varan, at the Committee hearings held at the Institute is also available at http://www.aph.gov.au/hansard/reps/commttee/R8604.pdf.

3. Moving Forward

Throughout the course of the past year, Minister Helen Coonan has repeatedly made comments highlighting the unique nature of the current juncture. At her address to the National Press Club on August 31st, 2005, for example, she referenced Cosser's observation that the current opportunity was akin to the building of the railroads in the 1900s – an opportunity that is 'not going to come along again.'[4] Her address to the inaugural ACMA conference highlighted her views that the interests of consumers are the end game translating into a need for new services and diversity.[5] More recently, in commenting on the release of the current discussion paper she noted:

> This changing landscape means it is timely for the Government to review its approach to media regulation and provides an opportunity to develop a strategic framework for media reform in Australia that truly brings us in to the digital age.[6]

We commend the Minister's vision in this regard. Clearly, if digital conversion is to be facilitated in the immediate future, a change of course is critical. In this context, we believe the measure to push back digital conversion to 2011-12 is prudent. Although we would have favoured a more aggressive approach to stimulating take up, we believe that proposed reforms provide a cautious approach which may yet prove to stimulate conversion against the newly proposed timeline. We caution, however, that for a 2012 end of simulcast to be met, it will be critical to meet key conversion milestones along the way. In this context, we would recommend further reforms should automatically trigger should the take up rate fall short.

4. Forecasting Digital Take Up

To explore the possible ramifications of the proposed policy we constructed a Bass diffusion model providing a forecast of digital take up going into the future based on Digital Broadcasting Australia's (DBA) data on take up to date (see figure 1). We caution that we cannot verify the degree to which the DBA accurately reflects market penetration but have used the DBA data as it is the only dataset we know of providing detailed year-by-year estimates through the end of 2005. As can be seen by DBA's data, the rate of digital take up has accelerated dramatically in the past year in particular. This may be the result of the dramatic decrease in set top box which are now available for as low as $85.

On the basis of our Bass diffusion model forecast, other things being equal, the current take up trajectory should facilitate analogue switch-off by 2012. This assumes, however, that current market forces will continue to influence take up. It is possible, for example, that the current take up reflects a disproportionately high number of adopters who purchased digital receivers so as to improve poor reception. The ACMA 2005 Digital Media in Australian Homes survey found that 51% of

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4 Address by Senator Coonan to the National Press Club "The New Multimedia World", August 31, 2005.

5 Opening address by Senator Coonan at the ACMA Broadcasting Conference, Canberra, November 9, 2005.

6 Address by Senator Coonan to CEDA "Meeting the Digital Challenge: Reforming Australia's Media in the Digital Age", Sydney, March 14, 2006.

adopters indicated improved reception and better picture as their primary motive in adoption.[7] There could be saturation effects associated with diffusion among households with poor reception that will limit the extent to which the existing trajectory continues.

In this context, the proposed reforms (liberalisation of restrictions on national broadcasters, no longer requiring HD-SD simulcast resulting in a defacto multichannel, potential datacasting services, etc.) may counter potential deceleration. Likewise, the reforms may further stimulate take up. On this basis we believe this trajectory can be used as a baseline against which digital penetration can be assessed. If the trajectory can be maintained, analogue switch-off in 2012 appears viable. This would result in a take-up of approximately 65% by June, 2008 and almost full conversion by 2010 allowing the final two years to focus on a strategy to reach diffusion laggards.

We have also attempted to provide a model assuming an 80% take up by 2012 so as to articulate a policy sentiment gap at key milestones. On this basis, a 6% shortfall in 2008 (59% take up) should signal warning lights indicating that the 2012 digital conversion deadline will not be met, other things being equal.

We recommend, on this basis, that the policy set automatic triggers for policy intervention in 2008 if take up is below 65% and in 2010 if take up is below 80%

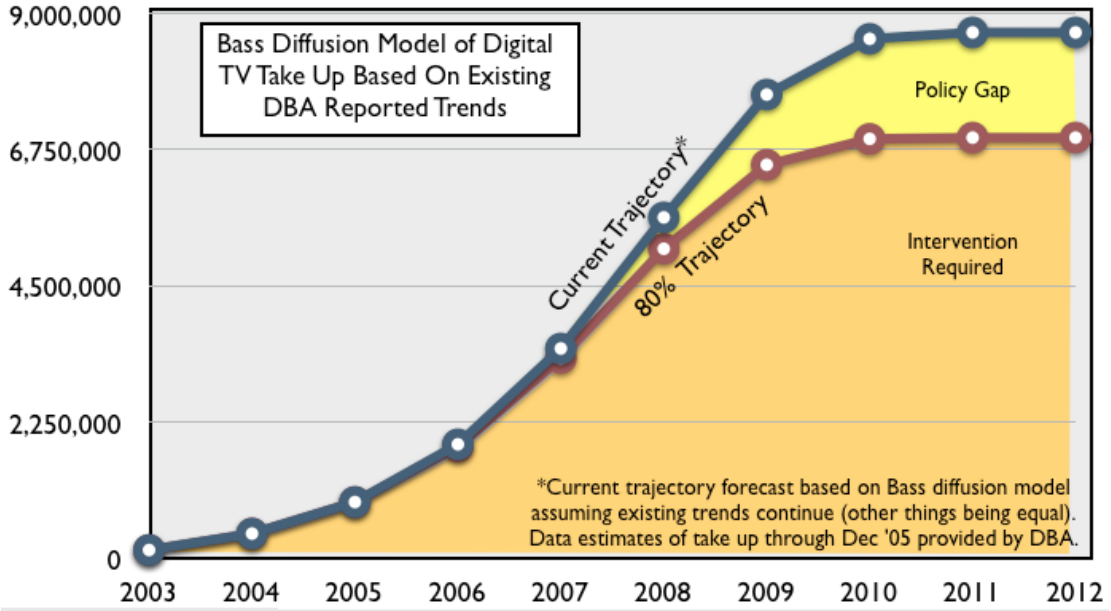

Figure (1): Bass Diffusion Model illustrating current trajectory of digital take up as well as alternative model assuming 80% take up in 2012.

We recommend further that such intervention be facilitated at two levels. If the take up by 2008 is at 65% or greater, we would view this as an indicator that the policy is on track to deliver analogue switch-off on schedule in 2012. We refer to this as the

[7] Loncar, T, Fairbrother, P and Daiziel, J. (2005***). Digital Media in Australian Homes***. Australian Communications and Media Authority Monograph 1.

'optimal trend'. If in 2008 such take up is between 55% and 65%, (our critical marker is actually 59%) then some form of intervention will be required to accelerate take up. This constitutes our proposed ***'moderate intervention trend'***. If, however, penetration remains below 55%, we would recommend aggressive intervention so as to dramatically correct the trend as the policy is at high risk of failing to stimulate digital take up. We will refer to this final scenario as the ***'aggressive intervention trend'***.

We will explore potential remedies which might be triggered at each of these critical thresholds later in the submission.

5. Balancing Broadcaster vs. Consumer Interests

At the outset, we think it is important to comment on consumer interests associated with adoption. Throughout the nine year history of digital television in Australia, successive ministers have articulated a need to balance between broadcaster and consumer interests. Minister Alston, for example, repeatedly highlighted the degree to which "ordinary Australian must be given a compelling reason to buy a new television set or a new set top box."[8] Providing better pictures and sound was never seen as being compelling enough, in their own right, to stimulate conversion. As Minister Alston explained, "But at the end of the day, I don't think you'd buy it just for that (picture clarity), you'd buy it because of the enhancement and the datacasting…"[9] And again: "Well look I think your point is valid in the sense that people, at the end of the day, want a greater range of choice of programs, rather than just simply wanting pretty pictures."[10] Minister Alston even cautioned against over-regulation cautioning that: "We must also avoid placing impediments on new and exciting technologies, denying consumers access to these services by imposing a regulatory regime that artificially constricts the development of the industry."[11]

It is important to also note that the advent of digital television in Australia was supposed to bring with it a host of new digital players designed to stimulate consumer uptake. Minister Alston asserted: "'The Government is confident that its decisions will ensure that Australians enjoy the best broadcasting in the world while introducing new information and entertainment options through the establishment of a thriving and viable datacasting industry." [12] Alston recognised three keys pillars to the digital equation: "The Government's objective is to ensure that the transition to digital TV is as smooth as possible for consumers and, at the same time, provides the right balance between new and existing players."[13] Yet it has been the interests of broadcasters, almost exclusively, that have proven to be the central focus on the policy to date.

The 1998 and 2000 digital conversion legislation recognised that existing broadcasters would need incentives to invest in digital infrastructure. For this reason, broadcasters were awarded certain concessions including the 4th network moratorium through the

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8 Press release: "Success of Digital TV Will Rely on Consumer Choice", June 30, 2000.

9 Remarks by Senator the Hon. Richard Alston, Minister for Communications, IT & the Arts, to Radio 2UE Drive, 21 December, 1999

10 ibid

11 Remarks by Senator the Hon. Richard Alston, Minister for Communications, IT & the Arts, to the Annual General Meeting of the Federation of Australian Commercial Television Stations, 25 August, 1999.

12 Press Release "Digital: New Choices, Better Services for Australians', 21 December, 1999.

13 Remarks by Senator the Hon. Richard Alston, Minister for Communications, IT & the Arts, to the Digital Revolution Conference hosted by Gilbert and Tobin, June 14th 2000.

end of 2006, the datacasting genre restrictions, the free loaning of digital spectrum and the like. We would argue that the necessary incentives have now been delivered to existing broadcasters. Indeed, such broadcasters have even received a bonus in the form of the absence of new competitors (datacasters) despite legislation requiring it. In this sense, the public has paid its debt… broadcasters have been given their fair go. In the path moving forward, the interests of consumers – who have been short-changed in this equation – should now prevail.

Accordingly, the question we raise is why the proposed policy framework continues to protect the interests of broadcasters above those of consumers? Clearly, consumers favour more content choice. The experience globally has demonstrated that such additional content is the main driver to digital uptake. Our 2002 survey soliciting the views of almost a third of those working in the digital television sector in Australia found that even the industry itself viewed multichannelling as the strongest driver.[14] Yet in Australia, both the advent of a fourth 'digital only' network and of multichannelling are prohibited.

A key contradiction in the proposed framework, we believe, is that many of the most compelling 'drivers' for digital uptake, from the consumer's perspective, are provisioned for the end of the simulcast period. In this sense they appear out of sequence.

There is another flaw in the 'driver following switchover' argument… it provides clear incentive to stunt rather than champion digital conversion. Why should broadcasters stimulate take up when the end result is the introduction of greater competition? We believe that the policy acts as a disincentive rather than a stimulant.

This, we believe, justifies the automatic triggers we are proposing. If market trends fail to grow at an adequate pace or if market sentiment fails to respond to the proposed incentives and stimulators, then consumer drivers should be triggered so that consumer interests can better shape digital take up.

5. The ITRI Survey (2006)

To help further explore the potential policy implications associated with the proposed framework, the Institute conducted a survey drawing from members in its TV Panel. This panel consists of 3000 viewers recruited to participate in ITRI's on-going research. Most of these panellists were recruited through newspaper ads and direct mail initiatives although a substantial portion were recruited through a local market research firm.

For the purpose of this research, panel members were surveyed to solicit their views on a range of issues associated with digital conversion. Sample boosting for key variables (owners of digital receivers, owners of high definition receivers) helped provide adequate cell sizes for analysis. Unfortunately, the short time frame between the release of the discussion paper (March 14, 2006) and the closing date for submissions (April 18, 2006) made it impractical for us to provide final findings, as the research is still in progress. However, we are happy to provide the Department with preliminary findings based on completion of the first 662 respondents. This

[14] Varan, D & Morrison, T (2003). ***Digital Television in Australia: 2002 Industry Survey***, Australian Broadcasting Authority.

represents an approximate statistical error rate of plus or minus 4%. We also weighted the observations in our sample so that the percentage of high definition DTT receivers (3.7%), standard definition DTT receivers (13%) and Pay TV subscribers (24%) exactly matched the actual percentages for penetration in Australia (DTT receiver estimates were based on the 2005 ACMA "Digital Media in Australian Homes" survey).[15] It should be noted that as the TV Panellists are drawn exclusively from the Perth metro area, the sample is not nationally representative. Nonetheless, some interesting trends emerge.

We presented the respondents with a range of hypothetical scenarios associated with potential digital content distribution including an a) IPTV service without commercials but which charged $2 for TV programs and $4 for movies; b) a similar IPTV service which was free but included advertising; c) a 4th network available on digital receivers only; d) a mobile phone platform charging $2 for TV programs and $4 for movies; e) a similar mobile platform which was free but included advertising; f) a limited subscription TV system available using their existing TV aerial; and finally g) an interactive datacasting channel. Respondents were provided with descriptions of each of the above scenarios and selected their response using a 7 point semantic differential scale from highly unlikely to highly likely. Figure (2) illustrates the weighted means of respondents based on our preliminary data.

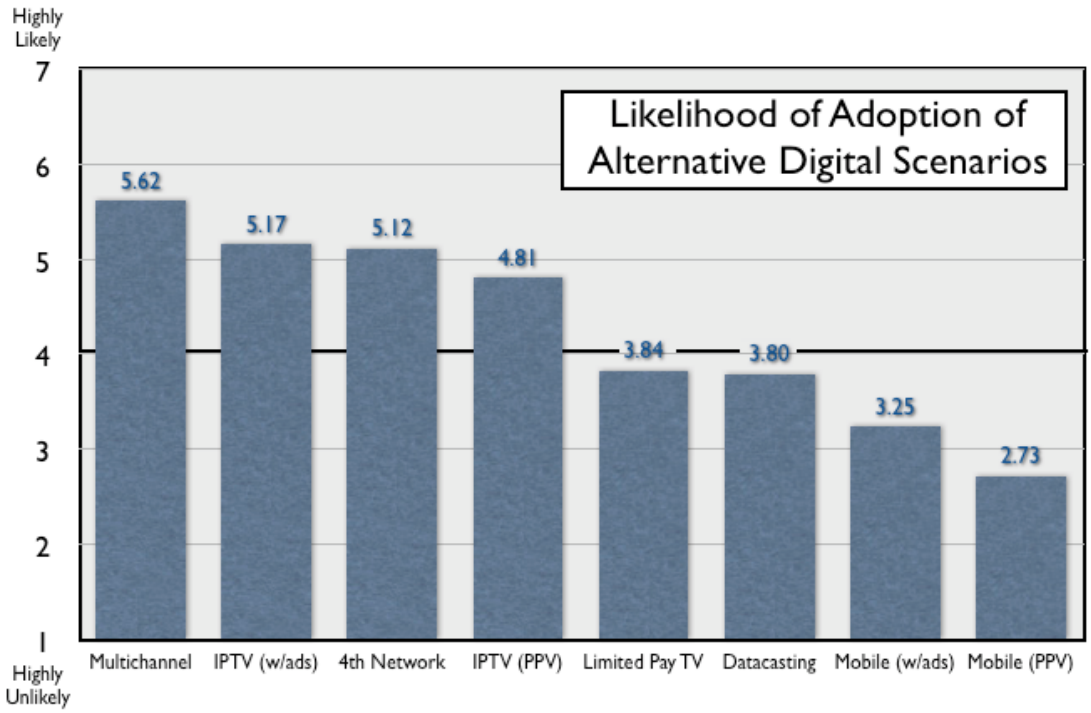

Figure (2): Weighted means reflecting likelihood of adoption of various digital scenarios.

As can be seen from the available data, the most compelling consumer drivers are multichannelling, IPTV (whether for free content with ads or for paid content) and the

[15] Loncar, T, Fairbrother, P and Daiziel, J. (2005***). Digital Media in Australian Homes***. Australian Communications and Media Authority Monograph 1.

availability of a digital only 4th network. None of the other options, including mobile video or datacasting, reflected positive consumer sentiment.

We divided our respondents into nine cells based on whether they had adopted digital receivers (further divided by high vs. standard definition receivers) and whether they were pay TV subscribers (or if not, whether they were likely to be in the next five years). This allowed us to explore the potential impact of these various scenarios on different consumer cohorts. Figure (3) provides a summary of means across the various sub-cells. Again, as the research is still in progress, it is not possible to draw definitive conclusions. Based on our existing data, however, some preliminary observations can be made.

	Likely Adoption	Pay TV Subscriber	Likely Future Subcriber	Not Likely Subscriber
HD Receiver	IPTV (PPV/Free)	4.87/4.60	6.25/6.00	3.55/4.20
	4th Network	4.87	6.38	5.35
	Mobile (PPV/Free)	2.60/2.50	2.50/2.50	2.35/2.40
	Multichannel	5.97	5.88	5.25
	Limited Pay TV	3.60	4.38	3.45
	Datacasting	3.80	4.75	3.25
SD Receiver	IPTV (PPV/Free)	5.00/4.92	6.20/6.30	5.66/5.15
	4th Network	4.50	6.60	6.27
	Mobile (PPV/Free)	1.75/1.92	3.30/5.00	2.31/2.00
	Multichannel	5.33	6.30	5.80
	Limited Pay TV	3.08	5.60	4.19
	Datacasting	4.25	3.70	3.54
No Receiver	IPTV (PPV/Free)	5.16/5.50	5.32/5.80	4.42/4.88
	4th Network	4.54	5.50	5.07
	Mobile (PPV/Free)	2.81/3.54	3.52/4.15	2.59/3.07
	Multichannel	5.63	5.74	5.58
	Limited Pay TV	3.84	5.09	3.47
	Datacasting	3.99	4.33	3.61

Figure (3): Table of means for adoption across the different digital scenarios broken down by pay TV subscription and digital TV receiver adoption (based on preliminary data).

The strongest responses to the adoption of IPTV services come from those who have not yet subscribed to a pay TV service but consider themselves likely to do so over the next five years and who have already adopted DTT receivers. This suggests that the strongest impact of IPTV will be in potentially preventing this cohort from subscribing to an existing pay TV provider.

An interesting trend also appears to be apparent with regard to the availability of a 4th digital only FTA network. Here, the impact associated with such a channel is marginal among existing pay TV subscribers but highest among those who consider themselves likely to subscribe in the next five years. Notwithstanding this trend, however, even with the availability of a 4th FTA network, this cohort still considers themselves likely to subscribe within the next five years (HD 5.25, SD 4.60, NR 5.22).

The pattern reflecting respondent enthusiasm for multichannelling is more evenly distributed reflecting positive sentiment across cells. The Limited Pay TV scenario provided positive appeal to likely future pay TV subscribers alone, suggesting that the potential effect of such a service would concentrate most on likely pay TV subscribers (effectively competing with existing providers for growth).

In exploring the potential impact of the various digital scenarios on existing pay TV subscribers, the available evidence shows no negative impact threatening existing subscriptions. It appears that existing subscribers perceive themselves as continuing in their loyalty despite the range of scenarios they were presented with.

6. Optimal Trend

As noted earlier, our Bass diffusion model predicts that there is a strong probability (other things being equal) that the existing digital adoption rate will meet a 2012 analogue switch-off target if current trends continue. In this context, the proposed reforms should further reinforce this trend.

We believe that a number of the proposed reforms should act to further stimulate the market. The removal of the genre restrictions on the multichannelling restrictions imposed on national broadcasters and the removal of the high definition / standard definition simulcast (which, in effect, allows for an HD multichannel) provide the market with significant opportunities to access new content.

We would have preferred to see specifics on the new rules associated with the datacasting regime. There certainly has been no shortage of reviews exploring this landscape… it is not clear why such detail is lacking in the proposed policy framework. Accordingly, it is not possible to predict which new players might emerge and what type of datacasting service they might offer. Hence, datacasting represents an unknown 'wildcard' in the conversion strategy… until such detail is provided it will be difficult to evaluate.

Under the optimal scenario, therefore, the current reforms may be sufficient to stimulate digital conversion in 2012.

7. Moderate Intervention Trend

Under a scenario where digital penetration is between 55% and 65% in mid-2008 (or below 80% by mid-2010), we recommend a moderate policy intervention. The primary change in policy we envision under this scenario is the removal of multichannel restrictions on FTA broadcasters. It is important to note that as the provision of such channels is optional (and not imposed on FTA broadcasters), there is a risk that it will not stimulate sufficient take up (in which case a more aggressive intervention may be required at the next two year review). Other intervention measures may also be considered at this juncture.

Broadcasters and the pay TV industry may argue that such competition (from a new 'digital only' broadcaster or from multichanelling) would significantly hurt their business models. As the Allen Consulting Group concludes with regards to such multichanneling: "… there is considerable scope to accommodate a reduction in industry-wide profitability before the operational viability of the industry at large is

threatened."[16] Likewise, the Allen Consulting Group report considers the argument that quality would diminish 'unfounded'.[17]

At any rate, by introducing a trigger for the implementation of commercial FTA multichannelling provisions, there are incentives for those who oppose such policy to help champion take up (to prevent such a trigger being activated).

8. Aggressive Intervention Trend

We maintain that a more aggressive intervention becomes necessary if, by 2008, DTT penetration remains below 55%. Our models predict that under this scenario, it will be unlikely that an analogue shut-down can be facilitated by 2012 necessitating further delay in bringing the simulcast period to a close.

We believe that under these circumstances, in addition to the changes suggested in a moderate intervention, a 4th 'digital only' FTA network should also be authorised as this will provide the best chance for stimulating take up (although multichannelling provides a more compelling proposition for consumers in our sample, the unpredictability of multichannelling activity by existing FTA networks makes this a less certain driver). Other measures to boost take up might also be considered.

9. Implications of Recommendations on Spectrum Planning

The three scenario mechanism we advocate imposes unique demands on existing spectrum planning. Assuming that the analysis of available spectrum conducted by the former Australian Broadcasting Authority is still relevant, most capital cities will only have capacity for two new digital channels.

We recommend that one of these channels be released for datacasting services. Consistent with our previous submissions, we believe that a beauty pagent represents the best means of allocating this spectrum. In this way, the task of differentiating a datacasting service from a FTA channel is left to aspirant datacasters (that such distinction is protected can then form a key consideration in the selection process).

We also recommend that new legislation be enacted that enables this datacaster to emerge as a platform integrator so that it can potentially deploy a backchannel, EPG and interactive applications that can be integrated across all channels. The lack of such platform integration, we believe, has retarded the evolution of digital interactive services in Australia. Common carrier provisions may need to be imposed on such a platform integrator to ensure that all channels have access to such services on equal terms.

As the intervention triggers may, potentially, necessitate the launching of a 4th network, we recommend that spectrum for the second of these two available channels be held in reserve until 2008. This provides the government with maximum flexibility. Not only can it then evaluate whether take up trends require such a network, but it can also review the performance of the then existing datacasters to evaluate whether to release an additional datacasting channel.

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16 Allen Consulting Group (2004). ***The Removal of Restrictions on Digital Multichanelling by Commercial Television Broadcasters: Potential Economic Impacts***. Report to the Department of Communications, Information Technology and the Arts.

17 ibid

In those cities where more than two channels are available, we would recommend that additional datacasting services be allowed so as to maximise innovation in the market.

10. The Role of Digital Pay TV

In other countries, digital pay TV platforms have played a key role in facilitating digital conversion. Accordingly, statistics reflecting digital take up often aggregate DTT, digital satellite and digital cable take-up. A key question which remains unresolved is whether such aggregation is appropriate in the Australian context.

A key assumption in other markets is that if viewers can access FTA networks over a Pay TV platform then such viewers are no longer dependent upon their terrestrial FTA broadcast system. As Australia has no 'must-carry' provisions for FTA signals over Pay platforms, it cannot inherently be assumed that digital Pay platforms provide appropriate substitution. Of course, such 'must-carry' provisions don't have to trigger immediately… it is reasonable to argue that until switch-off is facilitated such a provision doesn't inherently have to feature as a part of the digital conversion strategy. But if the Government wishes to include digitisation across Pay TV platforms as part of its overall 'take up' strategy, it must provide a mechanism ensuring that the FTA signals are available at the time of digital switch over.

Given that other facets of provisions for the end of the simulcast period are outlined in the discussion paper, we would maintain that such 'must-carry' provisions should also be included. Alternatively, such Pay TV numbers should not be included in aggregated estimates of digital take up as they have no direct bearing on analogue switch off.

11. The Digital Action Agenda

We were delighted to see a proposed 'Digital Action Agenda' feature as a central component of the proposed framework. We believe this constitutes an important part of any strategy moving forward. However, the 'real' impact of such an agenda depends heavily on the extent to which such a body is given clear mandate and on the degree to which its views are respected within the industry (necessitating a high profile leaders group). We believe that it is critical that the composition of such a leaders group draws from across the full value chain of the evolving industry representing at least the interests of broadcasters (both commercial and national), consumers, new prospective players, manufacturers (importers/retailers), advertisers and content producers.

12. Consumer Research as an Integral Part of the Action Agenda

The first Digital Action Agenda in 1999 ('Thinking Outside the Box') highlighted both technological and consumer drivers in its strategy for digital conversion. Although technical matters soon consumed deliberations associated with implementing digital strategy, consumer issues were largely neglected. For most of the past nine years, there has been little quality research designed to help provide empirical analysis of emerging trends. ACMA's recent digital survey represents a refreshing development in this regard.

We believe the articulation of a research agenda which clearly lays out key questions which should form a central part of the Digital Action Agenda. Such research not only helps better inform evolving policy, but it provides for a better foundation through which to facilitate dialog with key stakeholders. We are happy to assist in facilitating the development of such a research agenda as part of the wider Digital Action Agenda.

13. Quality of Digital Service

We have focused most of our comments in this submission on the take up of digital television receivers. While the proposed policy may ultimately prove its capacity to stimulate digital take up even further, it is also important to comment on the qualitative character of Australia's digital service.

For the most part, the proposed policy framework seems likely to produce a digital market with minimal innovation (primarily limited to 'zapping' boxes). Accordingly, this will help transplant television's existing paradigm with minimal disruption. However, the structure of the global market is changing dramatically. The lack of mandatory standards and a common integrated platform significantly constrain the capacity for our market to introduce many of the most exciting features made possible through the digital revolution.

This represents a 'lost opportunity' moving forward. To some extent, the changes we've suggested help alleviate this problem in part – by creating an integrated platform, for example, enabling interactivity. Our primary concern in this regard is that the lack of such innovation in the Australian FTA environment will insulate Australian content producers from the very significant changes that are taking place throughout Europe and the United States. This will directly challenge our cultural exports which will, in turn, gradually erode the local cultural industries who depend on occasional exports to underwrite investment in the domestic sector.

13. Conclusion

Throughout the past five years, we have been strong critics of the Government's digital television strategy. We approached this review sceptical of its viability. Following a more detailed review of the "Meeting the Digital Challenge" framework accompanied by our own analysis of market trends and consumer sentiment, we now believe the proposed policy objectives are achievable within the newly proposed timeframe. We strongly suggest, however, that mechanisms be introduced which act to intervene in the event that the consumer take up falls short of the necessary adoption rate to facilitate conversion. As we have demonstrated, more conclusive evidence of this diffusion pattern should be available by 2008.

Assuming a 2012 analogue-digital switchover, this currently positions us at Year 9 of a 15 year roll out. In other words, we have come almost two-thirds of the journey. The Australian digital TV experience to date has been difficult. In all likelihood, the path ahead will be no easier.

We are now confident, however, that with good policy implementation and a flexible approach to the path ahead, an end to the simulcast period can be achieved by 2012.

We welcome the opportunity to provide the Department with any additional information we can which might further assist it in its attempts to craft a path moving forward. Please feel free to contact our director, Professor Duane Varan, at varan@itri.tv if we can be of any further service.